



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/579,050

03/13/2007

Jonathan J. Halls

29610/CDT471

7833

4743

7590

10/07/2011

MARSHALL, GERSTEIN & BORUN LLP  
233 SOUTH WACKER DRIVE  
6300 WILLIS TOWER  
CHICAGO, IL 60606-6357

EXAMINER

MURATA, AUSTIN

ART UNIT

PAPER NUMBER

1712

NOTIFICATION DATE

DELIVERY MODE

10/07/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mgbdoCKET@marshallip.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/579,050	<b>Applicant(s)</b> HALLS ET AL.	
	<b>Examiner</b> AUSTIN MURATA	<b>Art Unit</b> 1712	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2011.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 5) ☒ Claim(s) 1,3-10 and 12-29 is/are pending in the application.
- 5a) Of the above claim(s) 21 is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1,3-10,12-20 and 22-29 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

Claim 21 is withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected group, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 11/29/2010.

### ***Response to Arguments***

In view of the arguments provided in the pre-appeal request the 102 rejections have been removed and an additional reference has been furnished to make a 103 rejection.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

**Claims 1, 3-10, 12-20 and 22-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over BURROUGHES (WO 99/48160) in view of MISHIMA (US 2002/0096995).**

Regarding claim 1,

BURROUGHES teaches an electroluminescent (EL) device that has a positive charge carrier injecting layer, a negative charge carrier injecting layer, and a light-emissive layer located between, that can also be positive or negative charge acceptors (material for transporting charge carriers) **page 5 line 7-17** and a semiconductor **page 7 lines 21-22**. More specifically, the reference teaches on **page 10 paragraph 3 a**

Art Unit: 1712

structure that includes a hole transport layer (first material for transporting charge carriers) followed by a light-emissive layer, followed by an electron transport layer (second material for transporting charge carriers) sandwiched between electrodes (cathode and anode). BURROUGHES teaches on **page 2 middle paragraph** referring to **figure 1a** the first layer is an anode and the layer on the opposite side is the cathode. The first layer is positive charge carriers (holes) and the second injection layer has negative charge carriers (electrons). The reference teaches the emissive layer can be F8 blended with TFB as shown in Table 2 **page 20** where the blend can optionally be made into a copolymer **page 26-27**. The F8 is an electron transporting and light emitting material while the TFB is light emissive and hole transporting. The copolymer would be a semiconducting layer of hole transporting, electron transporting and light emitting. The reference does not expressly teach adding another hole transporting material (first material) to the emissive copolymer layer.

However, MISHIMA teaches it is known to add combinations of hole-transporting material to the light-emitting layer to improve hole transporting power and keeping the driving volt low **[0038]-[0039]**. At the time of the invention it would have been prima facie obvious to one of ordinary skill in the art to include an additional hole transporting dopant to the light emissive copolymer of BURROUGHES to improve hole transporting power and keep the driving volt for the device low.

Regarding claim 3,

MISHIMA teaches the hole transporting material (first material) can be a polymer **[0038]**.

Art Unit: 1712

Regarding claim 4 and 5,

MISHIMA teaches that any hole-transporting material can be used [0038] and BURROUGHES teaches a known component for hole transporting material is TFB **page 10 and figure 3**. TFB from **figure 3** shows a repeat unit where the Ar pieces would be substituted for aryl (phenyl) groups. At the time of the invention it would have been prima facie obvious to one of ordinary skill in the art to add TFB as the hole-transporting material to the emissive layer as a simple substitution of known hole-transporting material.

Regarding claim 6,

The structures in **figures 3 (page 10)** show a functional group (R) from the phenyl group below the nitrogen.

Regarding claim 7,

The structures of the repeat units in **figure 3 (page 10)** for TFMO and TFB both have only one nitrogen atom.

Regarding claims 8-10,

BURROUGHES teaches that another of the three materials (second material) is PFM shown in **figure 3 (page 10)**. The structure shows the Ar parts substituted for aryl groups. The structure shows each of the Ar as a phenyl group.

Regarding claim 12 and 13

BURROUGHES teaches using a copolymer of TFB and F8. F8 is shown in **figure 3**.

Regarding claims 14 and 25,

**Table 1** on **page 17** shows the emission color of the repeat units of **figure 3** being blue (475nm area of the spectrum).

Regarding claims 15 and 26,

BURROUGHES teaches the materials of claim 1 **page 10** and teaches mixing them together **paragraph 2 page 7**. The reference does not teach using the particular material ratio claimed. However, **page 22** and **table 3** shows an efficiency change with varying ratios of material. At the time of the invention it would have been prima facie obvious to one of ordinary skill in the art to optimize the efficiency of the EL layer by changing the ratio of materials used (result effective variable). Therefore any ratio of material would raise a case of prima facie obviousness MPEP 2144.05 II.

Regarding claim 16-18,

BURROUGHES teaches in the **paragraph 2 on page 7** that the components of the light emissive layer are all soluble in the same solvent mixture for convenient co-deposition. The solvent used is xylene **paragraph 3 on page 28** (comprises poly-alkylated benzene).

Regarding claims 19 and 27-29,

BURROUGHES teaches that molecular weight is relevant for phase separation **Page 30 paragraph 2** but is silent to the molecular weights used. However, as a result effective variable, changing the molecular weight to different ranges is considered an optimization 2144.05 II and is not patentably distinct. At the time of the invention it would have been prima facie obvious to optimize the peak molecular weight of the material for the best phase separation.

Art Unit: 1712

Regarding claim 20,

BURROUGHES teaches the components of the light-emissive layer are phase separated, see **paragraph 5 on page 5**

Regarding claim 22,

BURROUGHES teaches the polymers can be partially conjugated, **paragraph 7 on page 12**.

Regarding claim 23 and 24,

BURROUGHES teaches on **page 10** using poly(2,7-(9,9-di-n-octylfluorene)) (a 9,9-disubstituted fluorine-2,7-diyl) which is F8 in **figure 3**.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AUSTIN MURATA whose telephone number is (571)270-5596. The examiner can normally be reached on Monday through Friday 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MICHAEL CLEVELAND can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1712

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AUSTIN MURATA/  
Examiner, Art Unit 1712

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1712